

# Earth's Interior

May 26, 2016 9:42 AM

How do we know about  $\oplus$ 's interior?

- Have only dug about 12 km!
- Can interpret from density of  $\oplus$  ( $5.5 \text{ g/cm}^3$ ) and crust ( $\frac{1}{2}$   $\oplus$ 's density) that core must be much denser  $\therefore$  iron...
- xenoliths (maybe from asthenosphere) are denser
- cosmic abundance curves ...
- SEISMIC WAVES!

## Compositional Layers

Crust - mostly silica (OSIAL)  
mantle - more mafic Si, O, Fe, Mg (SIMA)  
Core - Fe + Ni + 10% other (NIFE)

## Physical State Layers

Lithosphere - solid

Asthenosphere - plasticity, partly molten

Mantle - solid (except asthen part)

Outer core - liquid - convection creating mag. field

Inner core - solid

## Boundary Determinations

\* Crust  $\rightarrow$  Mantle (the "moho") - seismic waves abruptly speed up as pass from crust to mantle (Fig 11.7) (booklet pg 24)

to mantle (Fig 11.7) (booklet pg 24)  
→ compositional change

\* Lithosphere → Asthenosphere - waves abruptly slow down due to partly molten asthen.

\* In mantle - waves gradually increase speed due to increasing density

\* Mantle → Outer Core - P-waves (compression) slow down suddenly + refract (bend);  
S-waves (shear) disappear  
→ physical + chemical boundary  
solid → liquid                      getting denser

\* Outer → Inner Core - P-waves only reach here; some wave reflect (giving us the depth of the inner core), some refract but pass through  
→ physical boundary (liquid → solid)

⇒ Shadow Zone (Fig 11.11)



